XXV. *Observations on the changes the egg undergoes during incubation in the common fowl, illustrated by microscopical drawings.* *By Sir* EVERARD HOME, *Bart. V. P. R. S.*

Read May 16, 1822.

THIS has been a favourite subject with many of the most celebrated anatomists. The great HARVEY, MALPIGHI, and JOHN HUNTER, have done more than any others in the advancement of this enquiry.

HUNTER'S observations were never rendered so complete as to induce him to publish them; but what he has done is open to the public, both in the preparations in his Collection, and in his Cabinet of Drawings.

In these last, the vesicle which begins near the rectum, and afterwards envelopes the embryo, is clearly made out.

In the year 1815, Mr. DUTROCHET, an ingenious French anatomist, laid a Memoire upon this subject before the French Academie. Mr. G. CUVIER has given a Report upon this Memoire, but has not given the Memoire itself. He considers the author to be the first person who has clearly explained the rise and progress of the vesicle; but some of Mr. HUNTER'S drawings of it are dated 1773, the year I went to live in his house.

After all that has been done, much is still wanting to render the investigation complete; and to promote this object, the following Observations and Drawings are brought before the Society.

The gelatinous molecule, from which the future embryo

is to be formed, is originally placed on the surface of the yelk; it is found there before the yelk leaves the ovarium, and lies loose upon it, not being enveloped in any capsule.

The external membrane of the yelk is very thin and delicate, its surface is studded over with red dots, which disappear in its passage along the oviduct. When this is removed, there is a second thick and spongy covering under it, in which there is a natural aperture; and the areola, surrounding the molecule, is nothing more than the surface of the yelk, that is circumscribed by the margin of this aperture. No such aperture has been before taken notice of.

The molecule itself has a granulated appearance; in the centre it is made up of globules $\frac{1}{2800}$ part of an inch in diameter, surrounded by circles of a mixed substance, consisting of about two-thirds of the same small globules, and one-third of larger oval globules, about $\frac{1}{1600}$ part of an inch in length, and $\frac{1}{2000}$ part in diameter; these last, in their figure, resemble the red globules of the blood in the bird in every respect, excepting their red colour. Besides the globules there is some fine oil, which appears in drops when the parts are immersed in water. Oval globules and oil are also met with in the yelk itself, but in small proportion, and without colour.

All these parts, except the red dots on the surface, are met with in the yelk on a smaller scale, even six days before it is completely formed.

The ovarial yelk-bag gives way at the middle line, farthest from the insertion of the blood-vessels, and the yelk drops out into the mouth of the oviduct.

The yelk-bag does not immediately close, although it con-

tracts considerably: some time after it is nearly obliterated; and on the pedicle, the rudiments of a new yelk are formed.

The yelk-bags are exceedingly vascular; the outer membrane of the yelks is connected to them by vessels and fasciculi of fibres, but easily separated.

The yelk, while in the ovarium, has an oval form, and lies with its long axis towards the pedicle of the bag. See Plate XXXII. figures 1, 2, 3, 4, 5.

In its passage along the oviduct the yelk acquires the albumen, and before it comes to the lower end, the albumen is covered by a very fine membrane.

In this passage the thread-like substances, called by Mr. Hunter the poles, by others the chalazes, are formed; and terminate in the double membrane, which is added at the time the egg has reached the enlargement at the lower end of the oviduct. In the cloacus the shell is formed. If the egg is taken out before it has acquired a shell, it remains soft for several days; in one instance, after four days, it was so semi-transparent as to receive a yellow tint from the yelk. On puncturing the covering, the contents rushed out, but immediately resumed their form, being inclosed in the thin membrane of the albumen. The molecule with its areola, and the chalazes, were distinctly seen. The whole contents had less volume than the shell, particularly in the long axis, being truncate at both extremities. When immersed for an hour and half in distilled vinegar, the albumen and other parts had become somewhat coagulated. Plate XXXII. fig. 6, 7, 8, 9.

In the new laid egg the appearances are exactly the same,

whether it is impregnated or not. Plate XXXII. fig. 10, 11, 12.

When the shell and membranes under it are removed from one side, the yelk appears to be kept in its place by the poles, although allowed to rotate upon its axis.

The gelatinous molecule, with its areola, is always found upon the highest point of the upper surface of the yelk. Whether this arises from the molecule, or from the areola being the lightest part of the yelk, has not been ascertained.

When the hen begins to sit, a new laid egg, which has not been allowed to cool, will have the rudiments of the embryo formed some hours sooner than in the other eggs.

Having traced the formation of the egg itself through all the changes that take place from the time the yelk leaves the ovarium till it is impregnated, we are now to follow those changes that are met with during incubation till the embryo becomes a completely formed chicken.

In 4 hours after incubation the outer edge of the areola had become enlarged, and that part of it next the molecule appeared darker. One end of the molecule appeared like a white line, the first rudiments of the embryo. Plate XXXIII. fig. 1, 2, 3.

In 8 hours, the white line was found to be extended, and the rudiments of a brain and spinal marrow were formed, surrounded by a membrane, which afterwards becomes amnion.

The areola had extended itself, and the surface beyond the line which formed its boundary had acquired the consistence of a membrane, and had also a distinct line by which it was

circumscribed. This I shall call the outer areola. In the space between these two areolas, there were distinct dots of an oily matter. This extension of membrane to the outer areola lies under the inner membrane of the yelk, and can readily be removed entire. Plate XXXIII. fig. 4, 5, 6.

In 12 *hours*, the rudiments of the brain were more distinct, as well as of the spinal marrow. These parts were placed upon a black ground in vinegar, and hardened; the upper end showed the tuberculum annulare of the brain, from which passed down two semi-transparent lines resembling an appearance peculiar to the spinal marrow of the bird. Plate XXXIII. fig. 7, 8, 9.

In 16 *hours*, there was a farther advance in the structure of all these parts. Plate XXXIV. fig. 1, 2, 3.

In 24 *hours*, a still greater increase. Plate XXXIV. fig. 4, 5, 6.

In 36 *hours*, the head was turned to the left side. The cerebrum and cerebellum appeared to be distinct bodies; the iris was seen through the pupil of the eye. The intervertebral nerves were nearly completely formed; those nearest the head the most distinct. A portion of the heart was seen.

At this period, under the inner areola, apparently at the termination of the spinal marrow, a vesicle had begun to protrude. In some eggs it is seen earlier than in others, and has been observed before the heart had become visible. Plate XXXIV. fig. 7, 8, 9.

In 2 *days* 12 *hours*, the spinal marrow was found to have its posterior part enclosed; the auricles and ventricles of the heart were seen, the auricles filled with red blood. An arterial trunk from the left ventricle gave off two large

vessels, one to the right side of the abdomen of the embryo, the other to the left, sending branches over the whole of the areolar membrane, which was bounded on each side by a large trunk carrying red blood; but the two trunks did not unite, there being a small space on one side rendering the circle incomplete.

The vesicle was somewhat increased in size; it lay in the lower part of the abdomen, the parietes of which were not yet formed. Plate XXXV. fig. 1, 2, 3.

In 3 days, the outer areola had extended itself over $\frac{1}{3}$ of the circumference of the yelk, carrying the marginal arteries along with it to the outer edge, but diminished in size. The brain was much enlarged, consisting of four cavities containing a fluid, the cerebellum still the largest. The spinal marrow and its nerves were more perfectly formed. The eye appeared only to want the nigrum pigmentum.

The right ventricle of the heart contained red blood: the arteries could be traced to the head: the rudiments of the wings and legs were formed: the vesicle was farther enlarged, but its vessels did not carry red blood. It had forced its way out through the external covering of the yelk, and opened a communication through this slit, by which a part of the albumen was admitted to mix itself with the yelk, and give it a more oval form. At this period the embryo is generally found to have changed its position, and to be wholly turned on the left side. Plate XXXV. fig. 4, 5, 6.

In 4 days, the vesicle was more enlarged and more vascular, its vessels containing red blood.

The optic nerve and nigrum pigmentum of the eye were visible; the other parts had become more perfectly formed,

The outer areola had extended itself half over the yelk, which had now become still more encreased in size, a greater portion of albumen having become mixed with it. Plate XXXV. fig. 7, 8, 9.

In 5 days, the membranous bag that formed the vesicle had acquired a great size, and become exceedingly vascular in its coats; the cavity contained a fluid. The yelk had become thinner in its consistence, more of the albumen having been mixed with it. Plate XXXVI. fig. 1, 2, 3.

In 6 days, the vascular membrane of the areola had extended farther over the yelk. The vesicle at this time had suddenly expanded itself in form of a double night-cap over the yelk and its coverings, beginning to enclose the embryo.

This change is so rapid, that it has been with difficulty detected, and different accounts have been given of the mode in which it takes place.

The amnion contained water, in which the embryo floated, suspended by the vessels supplying the areolar and vesicular membrane.

The brain had become enlarged to the size of the body of the embryo: its vessels were distinctly seen. The two eyes equalled in size the whole brain: the marsupium was seen covered with nigrum pigmentum. The vessels of the cerebellum could be traced into the convolutions of the pia mater.

The parietes of the thorax and abdomen had begun to form; the wings and legs were nearly completely formed, as well as the bill. At this period muscular action was first noticed. Plate XXXVI. fig. 4, 5, 6.

In 7 days, the vesicle having extended over the embryo,

had begun to enclose the areolar covering of the yelk, and a pulsation was distinctly seen in the trunk that supplied the vesicular bag with blood. The pulsations were 79 in a minute while the embryo was kept in the temperature of 105°, but when the temperature was diminished the pulsation ceased, and when restored was reproduced. The pulsation was kept up, by attention being paid to the temperature, for 36 hours. Muscular action had become vigorous in the limbs.

When the embryo was completely immersed, although the temperature of the water was 108°, the pulsations immediately ceased, the blood being no longer aerated. Plate XXXVI. fig. 7, 8, 9.

In 8 days, the anastomosing branches of the vesicular circulation had the arterial pulsation very strong in them. Plate XXXVII. fig. 1, 2, 3.

In 9 days, the vesicle had nearly enclosed the yelk, but not intirely; for when the embryo was turned upon its back, and the opposite surface examined, a portion of yelk was unenclosed, and beyond it some of the albumen was met with not mixed with the yelk. Plate XXXVII. fig. 4, 5, 6.

In 10 days, the vesicle was opened, and the upper half turned aside. When the amnion, which had become full of water, was opened and the embryo taken out, the thorax was found completely enclosed; the roots of the feathers were distinct, and the passage for the areolar as well as the vesicular vessels exposed.

In 14 days, the yelk remained out of the body. When the thorax and abdomen were opened, and the heart as well as the lobes of the liver turned aside, the trunks of the blood-vessels could be traced to the heart; but as the arteries

immediately after death become empty and the veins remain full, the vein from the vesicle, and that from the areola were the most conspicuous.

In 18 *days*, the greater part of the yelk was drawn into the body.

In 20 *days*, the chick was completely formed; the yelk was entirely drawn in, and only some portions of the membrane of the vesicle appeared externally. The yelk passed into the intestine a little way above the openings of the cœca.

Having traced the progress of the formation of the chick step by step, from the first appearance of the molecule found on the yelk before it leaves the ovarium to the complete evolution of all its parts, and its leaving the shell, I shall now take advantage of this investigation, which, illustrated as it is by Mr. Bauer's microscopical drawings, will stand long without a parallel.

Although the processes by which the human fœtus and that of quadrupeds are formed, differ in many essential particulars from those employed in the bird, some circumstances are common to both; one of these, the mode in which the vesicle bursts the membranes of the yelk is distinctly seen in the embryo in the egg hatched out of the body, and explains what takes place where the embryo is attached to the uterus, which otherwise could not have been ascertained.

In a former paper, I have shown the formation of the ovum in the corpus luteum; I have traced this ovum into the uterus, where it became concealed in the soft flocculent bed of efflorescent coagulable lymph prepared to receive it. That it is afterwards enveloped in this moss-like covering, has been demonstrated by my revered master in Human Anatomy,

Dr. WILLIAM HUNTER; but in what manner the embryo breaks its amnion, and opens a communication with the uterus, is a question on which Dr. HUNTER is silent: indeed it is one that could not be touched upon till it was ascertained that the ovum, when it arrived at the uterus, was completely enclosed in the amnion.

Having been the first to ascertain that curious fact, and having arrived at that knowledge through the microscopical observations of Mr. BAUER, I am peculiarly gratified, that the same powers, exerted in another correspondent investigation, should have enabled me to give the solution.

In the ovum of the hen, the rudiments of the embryo require nourishment from one source, aeration from another. In the human ovum one source supplies both; but in either case there is a necessity for a communication between the blood vessels of the embryo and the source of their blood's aeration; and this is effected in exactly the same manner in the human species, the quadruped, and the bird. Out of this the embryo acquires a mode of suspension in the amnion which secures it from injury, both in the bird and quadruped. The mode is as follows: that bag, which is afterwards in the human species and in quadrupeds to become the urinary bladder, is enlarged to a certain size with such rapidity, that it bursts the amnion, which is prepared to be so ruptured, and the arteries lying upon its two sides are carried directly into contact with the chorion, and there the placenta is formed in the open space between the two edges of the chorion. This is exactly similar to the vesicle in the chick bursting the covering of the yelk, and forming the enveloping bag. It is deserving of remark, that in the human ovum, and that of

quadrupeds, there is a natural opening in the external membrane; in the bird, the natural opening is in the internal one, which in its structure bears a resemblance to the chorion.

EXPLANATION OF THE PLATES.

Plate XXXII.

Fig. 1. The ovarium of a hen that had been laying for some time. Natural size.

Fig. 2. A yelk taken out of its bag, and lying in its natural position horizontally. Natural size.

Fig. 3. A small portion of the yelk, with the molecule lying on the bare surface of the yelk within the aperture of the inner membrane of the yelk; the external membrane is turned aside, and shows a concave aperture which circumscribes exactly the molecule. Magnified 5 diameters.

Fig. 4. The bare molecule after being hardened in distilled vinegar, laid on a black ground. Magnified 10 diameters.

Fig. 5. The globules of which the inner areola is chiefly composed. Magnified 400 diameters.

Fig. 6. An egg found in the oviduct of the same hen from which the above ovarium was taken. Natural size.

Fig. 7. The same egg, its soft and semi-transparent shell being removed, the albumen and yelk are enclosed in the double membrane which lines the shell. Natural size.

Fig. 8. A small portion of the yelk of the same egg, with the molecule lying on its bare surface within the orifice of the inner membrane, and the external membrane turned aside. Magnified 5 diameters.

Fig. 9. The same molecule hardened, and laid on a black ground. Magnified 10 diameters.

Fig. 10. A new laid egg. Natural size.

Fig. 11. A small portion of the yelk of the same egg, with the molecule lying on its bare surface, and the external membrane of the yelk turned aside. Magnified 5 diameters.

Fig. 12. The molecule hardened in vinegar and laid on a black ground. Magnified 10 diameters.

PLATE XXXIII.

Fig. 1. *An egg, opened* 4 *hours* after incubation. Natural size.

Fig. 2. A small portion of the yelk, with the molecule and areola under the external membrane of the yelk. Magnified 5 diameters.

Fig. 3. The bare molecule, hardened and laid upon a black ground. Magnified 10 diameters.

Fig. 4. *An egg, opened* 8 *hours* after incubation. Natural size.

Fig. 5. A small portion of the yelk, with the molecule and enlarged areola lying on its surface under the external membrane. Magnified 5 diameters.

Fig. 6. The same molecule with its enlarged areola, hardened, and laid on a black ground. Magnified 10 diameters.

Fig. 7. *An egg, opened* 12 *hours* after incubation. Natural size.

Fig. 8. A small portion of the yelk, with the embryo and areola lying on its surface under the external membrane. Magnified 5 diameters.

Fig. 9. The same embryo and areola hardened and laid on a black ground. Magnified 10 diameters.

Plate XXXIV.

Fig. 1. *An egg, opened* 16 *hours* after incubation. Natural size.

Fig. 2. A small portion of the yelk, with the embryo and areola lying on its bare surface, and the external membrane of the yelk entirely removed. Magnified 5 diameters.

Fig. 3. The same embryo, and a portion of the areola laid on a black ground. Magnified 10 diameters.

Fig. 4. *An egg, opened* 24 *hours* after incubation. Natural size.

Fig. 5. A small portion of the yelk, with the embryo and areola lying on its surface, and the external membrane of the yelk entirely removed. Magnified 5 diameters.

Fig. 6. The same embryo, and a portion of the areola laid on a black ground. Magnified 10 diameters.

Fig. 7. *An egg, opened* 36 *hours* after incubation. Natural size.

Fig. 8. A small portion of the yelk, with the embryo and areola lying on its surface, and the external membrane of the yelk removed. Magnified 5 diameters.

Fig. 9. The same embryo, and a portion of the areola laid on a black ground. Magnified 10 diameters.

Plate XXXV.

Fig. 1. *An egg, opened two days and twelve hours* after incubation. Natural size.

Fig. 2. A portion of the yelk, with the embryo lying in its natural position in the centre of the vascular areola, and the external membrane of the yelk removed. Magnified 6 diameters.

Fig. 3. The same embryo, with the principal branches of its blood-vessels, turned upon its back, and laid upon a black ground. Magnified 6 diameters.

Fig. 4. *An egg, opened 3 days* after incubation. Natural size.

Fig. 5. A portion of the yelk and vascular areola, with the embryo in its centre, lying entirely on its left side, which is its natural position. Magnified 6 diameters.

Fig. 6. The same embryo turned on its right side, and laid on a black ground. Magnified 6 diameters.

Fig. 7. *An egg, opened 4 days* after incubation. Natural size.

Fig. 8. The embryo in its amnion, and with its vesicle removed from the yelk, and laid in its proper position on a black ground. Magnified 4 diameters.

Fig. 9. The same embryo without its amnion, turned on its back, and laid on a black ground. Magnified 4 diameters.

PLATE XXXVI.

Fig. 1. *An egg, opened 5 days* after incubation. Natural size.

Fig. 2. The embryo in its amnion, and with its vesicle removed from the yelk, and represented in its natural position. Magnified 3 diameters.

Fig. 3. The same embryo taken out of its amnion, and turned upon its back, having on its right side the increasing vesicle, and on its left a small portion of the areolar membrane with the principal trunk of the blood-vessels. Magnified 3 diameters

Fig. 4. *An egg, opened six days* after incubation. Natural size.

Fig. 5. The embryo in its amnion, and with its vesicle removed from the yelk, and represented in its natural position. The vesicle at this period forms an adhesion with the amnion at the lower extremity. Magnified 3 diameters.

Fig. 6. The same embryo turned on its back, having on its right side a small portion of the vesicular, and on its left, of the areolar membrane, with the principal trunks of their blood-vessels. Magnified 3 diameters.

Fig. 7. *An egg, opened the seventh day* after incubation. Natural size.

Fig. 8. The embryo in its amnion, and with its vesicle removed from the yelk, and represented in its natural position. The vesicle, which at this period covers entirely the embryo, is here turned downwards, and shows the increasing adhesion with the amnion. Magnified 2 diameters.

Fig. 9. The same embryo extracted from its amnion, and turned upon its back, having on its right side a small portion of the vesicular, and on its left, of the areolar membrane, with the principal trunks of their blood-vessels. Magnified 2 diameters.

PLATE XXXVII.

Fig. 1. *An egg, opened* 8 *days* after incubation. Natural size.

Fig. 2 The embryo within its amnion, in its natural position, and with a portion of the vesicular and areolar membranes, with the principal trunks of their blood-vessels. Magnified 2 diameters.

Fig. 3. The same embryo turned on its back, having small portions of the vesicular and areolar membranes protruding from the enclosed part of the abdomen. Magnified 2 diameters.

Fig. 4. *An egg, opened nine days* after incubation. Natural size.

Fig. 5. The same egg turned more to its right side, to show that at this period, neither the vesicular, nor the areolar membranes, yet enclose the whole yelk, nor is the albumen entirely absorbed. Natural size.

Fig. 6. The embryo of the same egg, with a portion of the vesicular and areolar membranes, and their principal blood-vessels; the amnion is opened as far as the vesicular adhesion admits. Magnified 2 diameters.

Fig. 7. *An egg, opened ten days* after incubation. Natural size.

Fig. 8. The same egg with the external half of the vesicle removed, showing the embryo distinctly in its amnion, and the inner half of the vesicle, with its blood-vessels covering the whole. Natural size.

Fig. 9. The embryo of the same egg, with the amnion and the vesicle entirely removed, to show the opening in the abdomen, from which portions of the vesicular and areolar membranes and turns of the intestines are protruding; the roots of the feathers are now visible. Magnified 2 diameters.

Plate XXXVIII.

Fig. 1. *An egg, opened fourteen days* after incubation. Natural size.

Fig. 2. The same egg, with the external half of the vesicle removed, to show the embryo in its amnion, and that the yelk is not yet entirely enclosed by the areolar membrane. Natural size.

Fig. 3. The embryo of the same egg; its thorax and ab-

domen opened ; the heart and the lobes of the liver turned aside to show the course of the principal trunks of the blood-vessels which go to the vesicle and to the areolar membrane ; the yelk, at this period, is still entirely without the body of the embryo. Magnified 2 diameters.

A.A. a portion of the amnion. B.B.B. the vesicle. C.C. a portion of the areolar membrane.

Plate XXXIX.

Fig. 1. *An egg, opened eighteen days* after incubation. Natural size.

Fig. 2. The same egg, with the external half of the vesicle removed. Natural size.

Fig. 3. The chick taken from the same egg; the thorax and abdomen laid open to show that the greater part of the yelk is now drawn into the body. Natural size.

Plate XL.

Fig. 1. *An egg, opened twenty days* after incubation, the vesicle and amnion entirely removed, to show the natural position of the perfectly formed chick. Natural size.

Fig. 2. The chick taken out of the same egg, to show that the yelk is now entirely drawn into its body, only some small portion of the vesicular membrane protruding from the orifice of the abdomen, which is not yet quite closed. Natural size.

Fig. 3. The same chick opened, to show the natural position of the viscera and the yelk at this period of the incubation. Natural size.

Plate XLI.

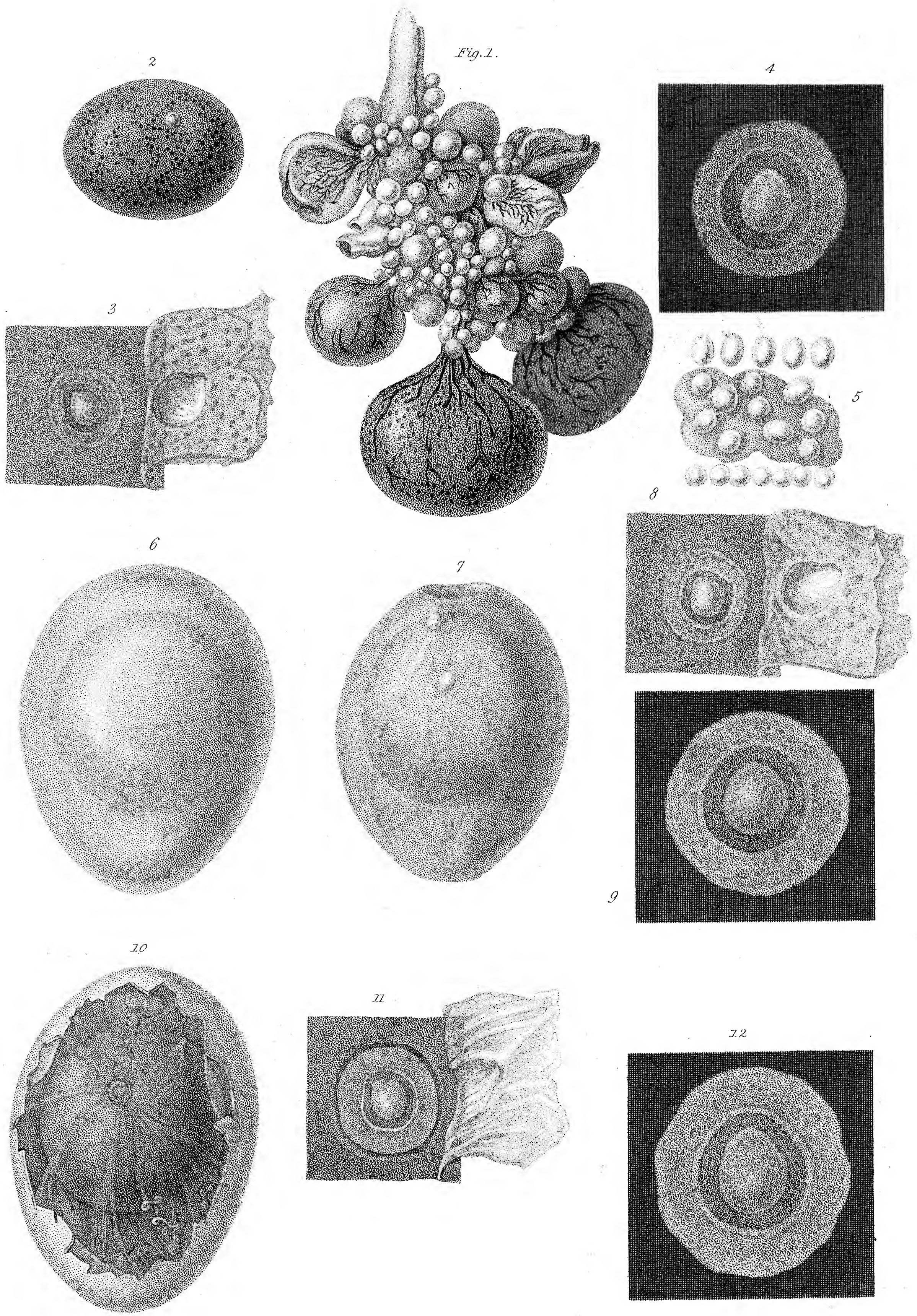
Fig. 1. *A chick, after being hatched 24 hours;* the thorax and abdomen opened, to show the natural position of the viscera and yelk; the crop at that time is full of corn, and other food. Natural size.

Fig. 2. The viscera of the same chick; the heart turned upwards, and the two lobes of the liver laid aside, to show that the vena cava is a continuation of the vesicular vein, and terminates in the right auricle of the heart, after receiving the venæ hepaticæ. Magnified 2 diameters.

The areolar vein terminates in the vena portarum, which is not seen in this view.

Fig. 3. A posterior view of the gizzard and œsophagus, to show the origin of the duodenum, and the course of the intestinal canal, of the same chick. Magnified 2 diameters.

Fig. 4. An anterior view of the rectum, and colon, to show at A, where the great mass of the yelk has been cut off. Magnified 2 diameters.



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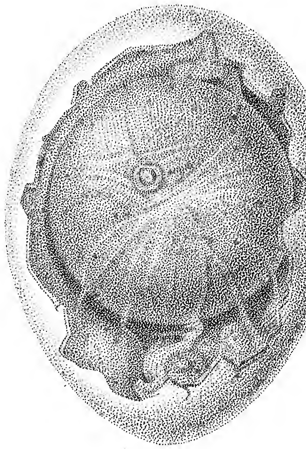

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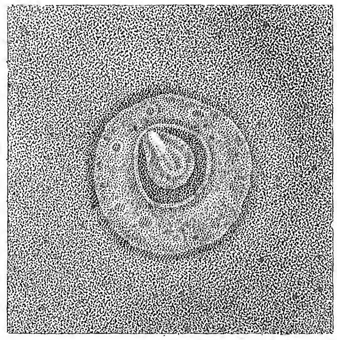

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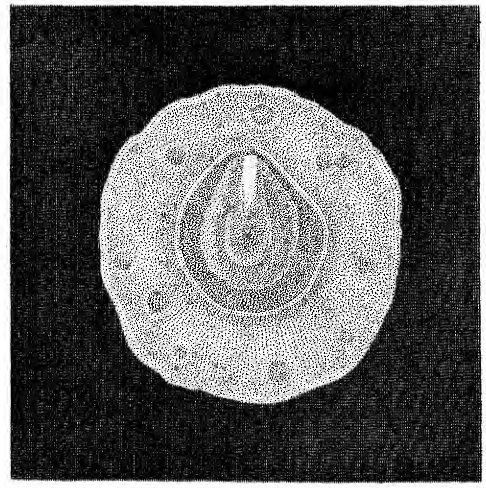

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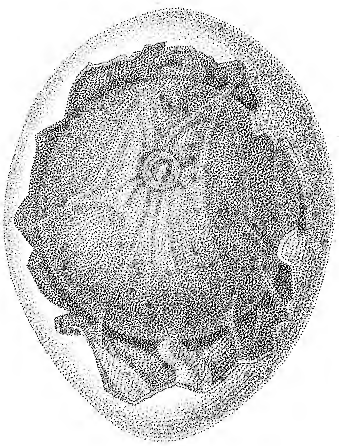

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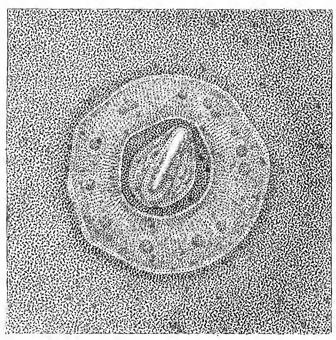

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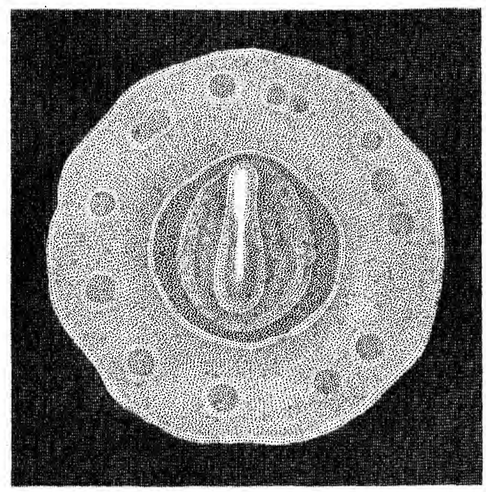

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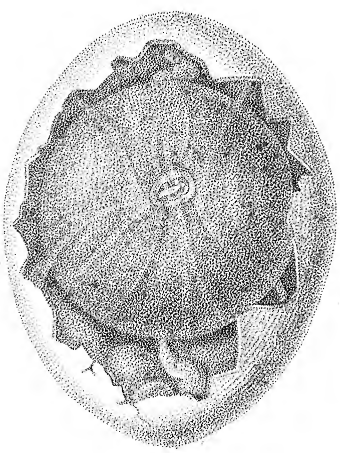

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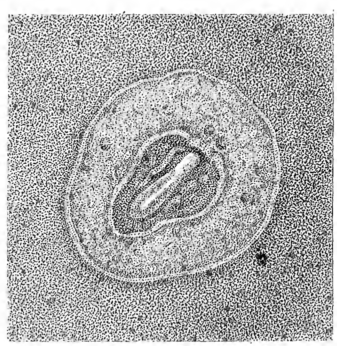

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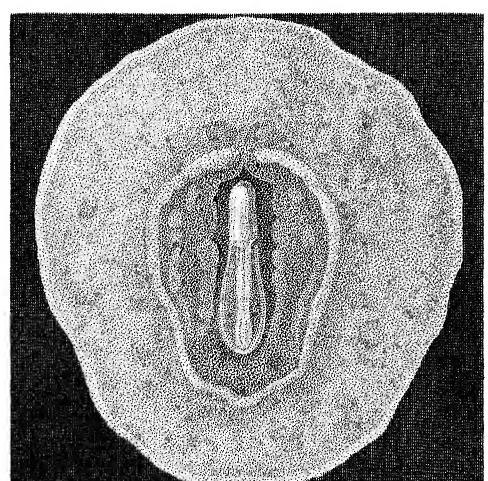

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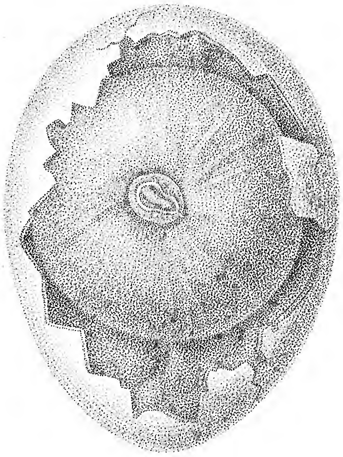

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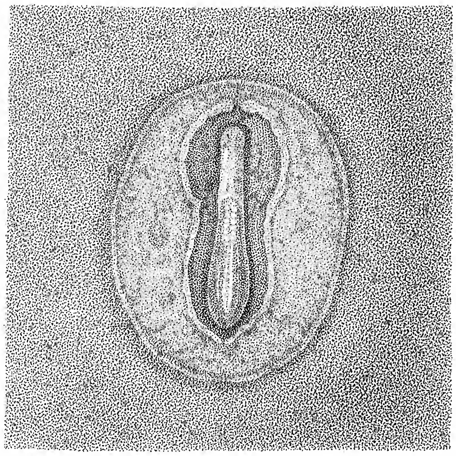

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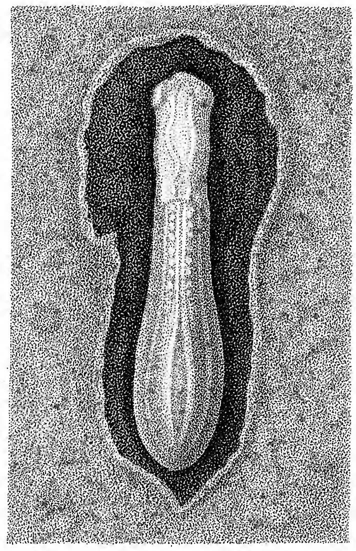

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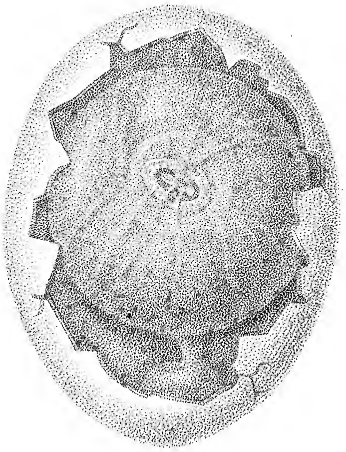
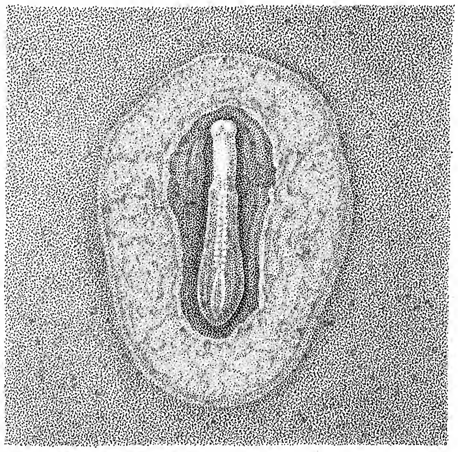


Fig. 5.



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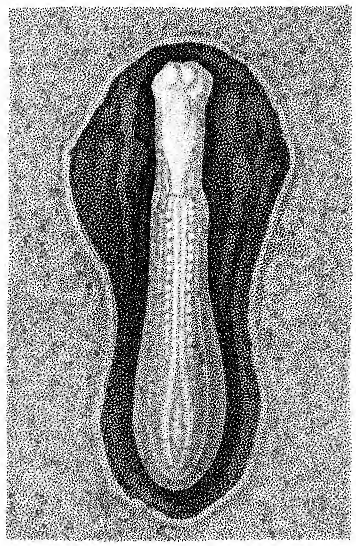

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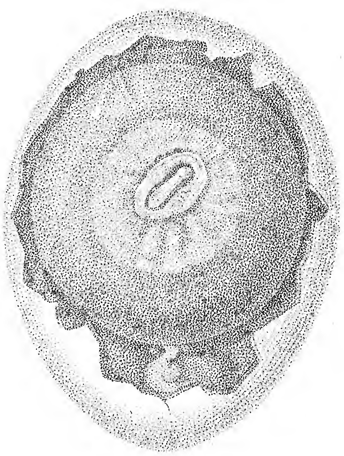

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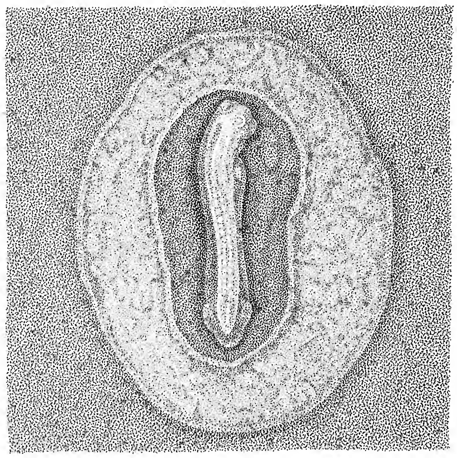

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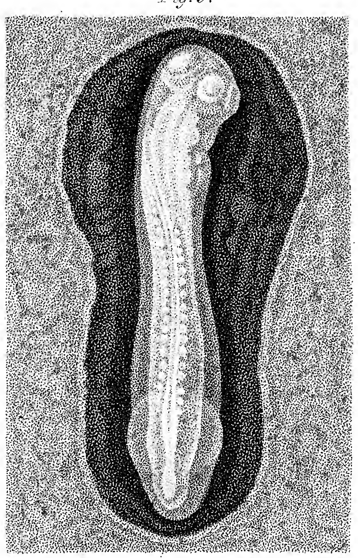

Franz. Bauer delt. Js. Basire sculpt.

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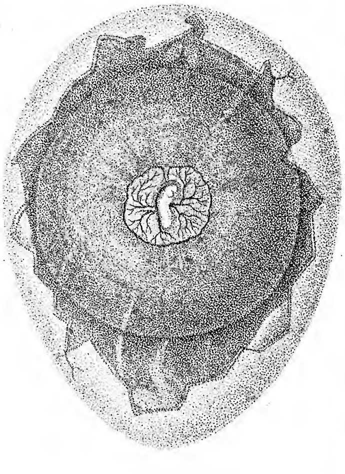

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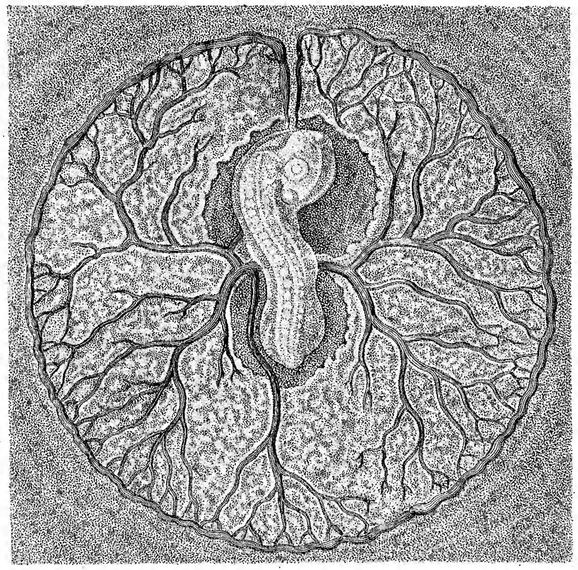

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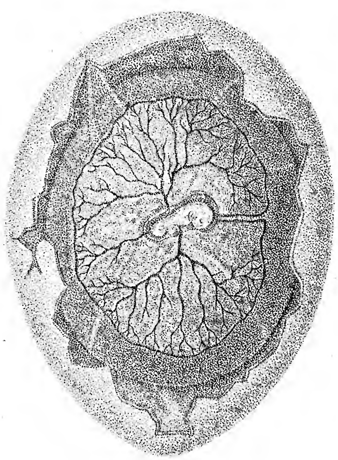

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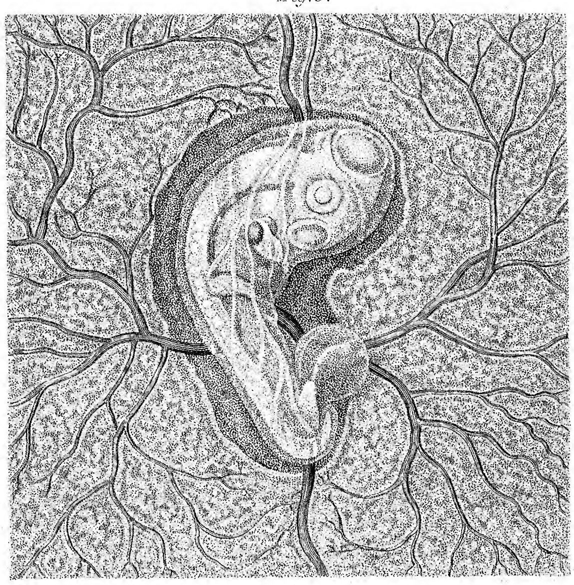

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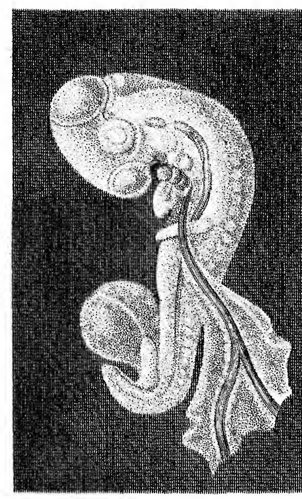

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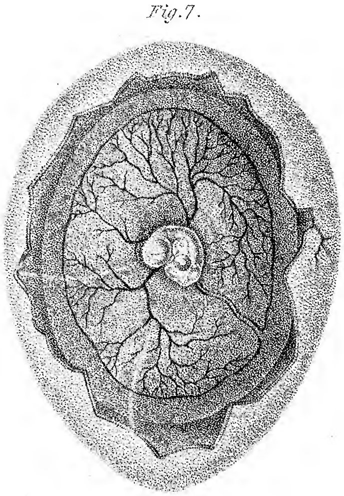

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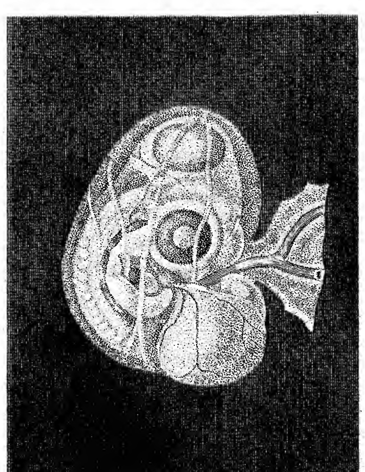

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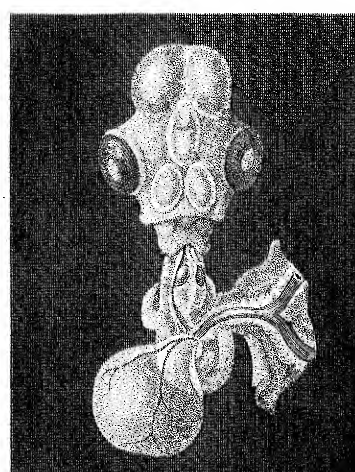

*Franz Bauer del.*t *J.*s *Basire sculp.*t

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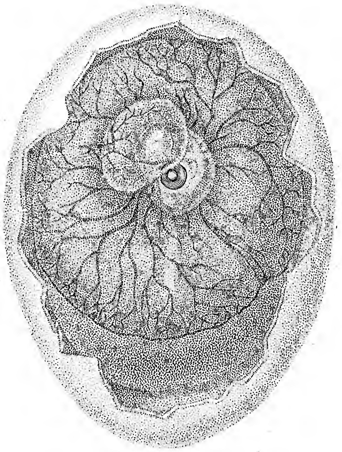

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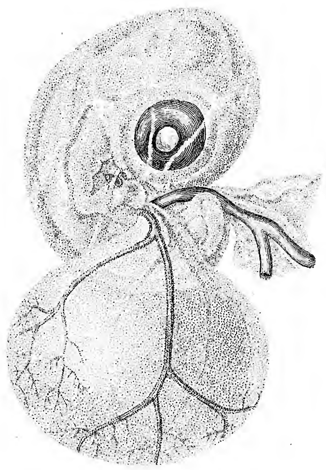

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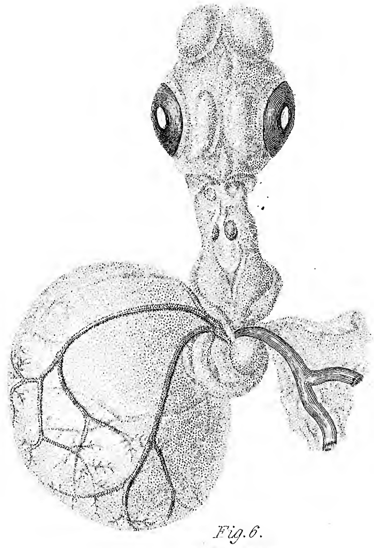

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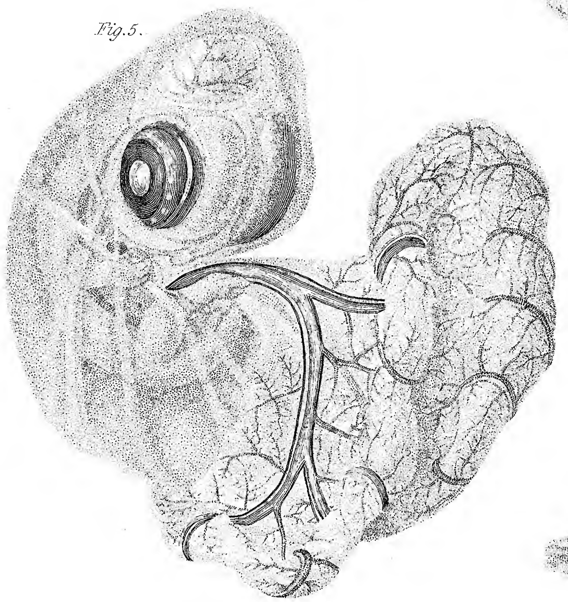

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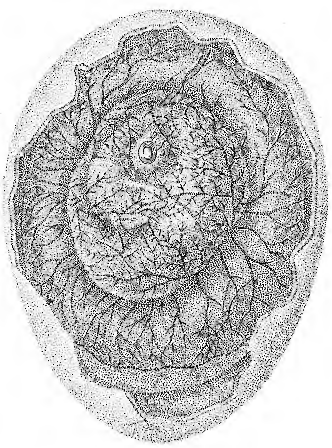

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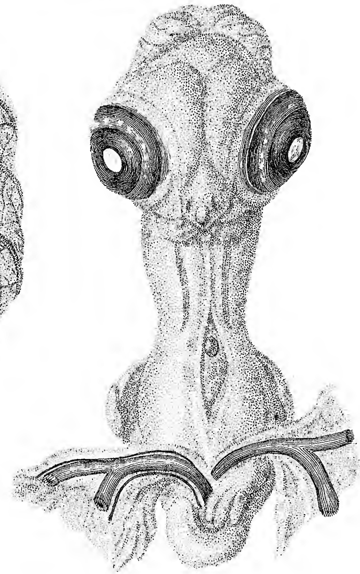

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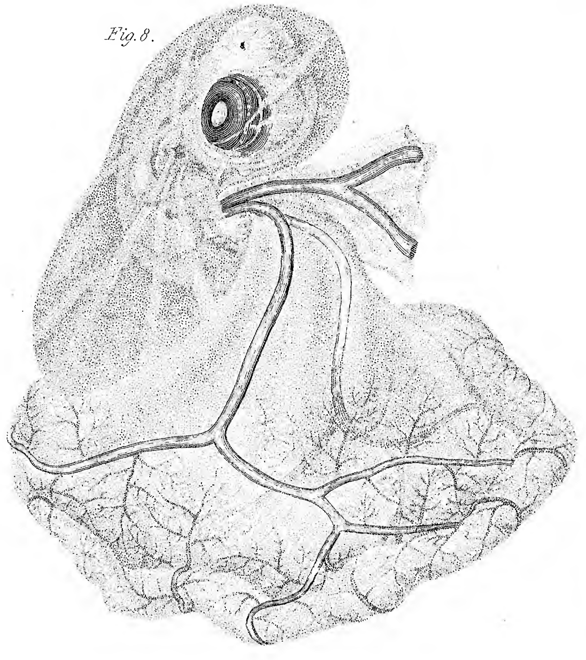

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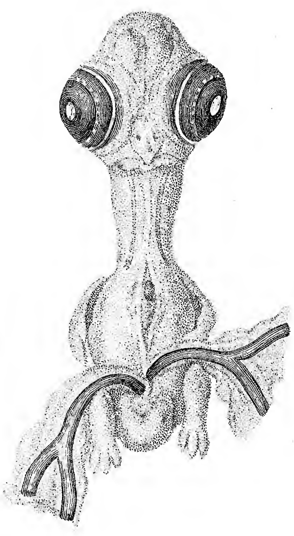

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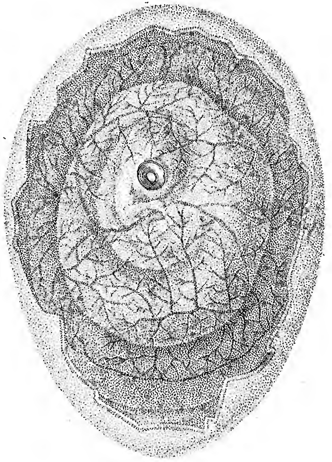

Franz. Bauer del^{t}. J^{s}. Basire sculp^{t}.

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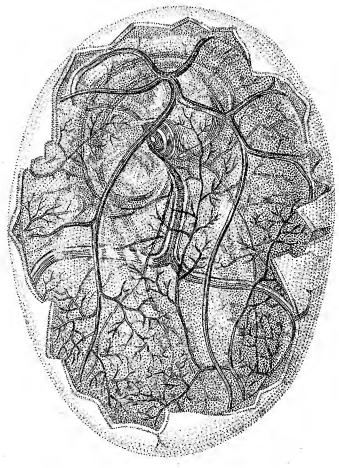

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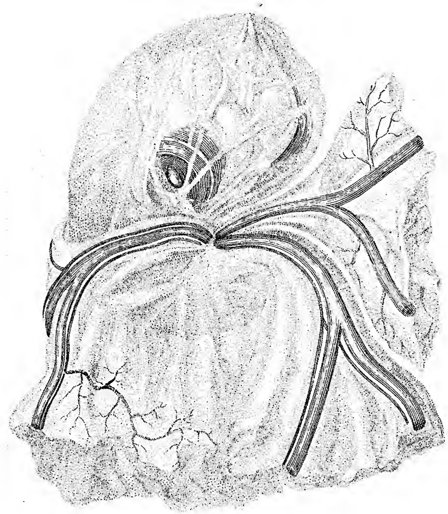

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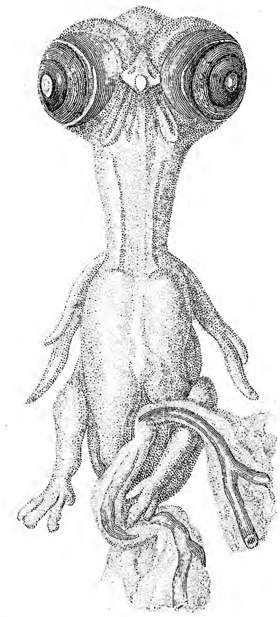

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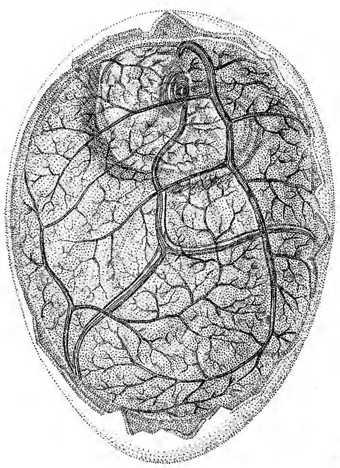

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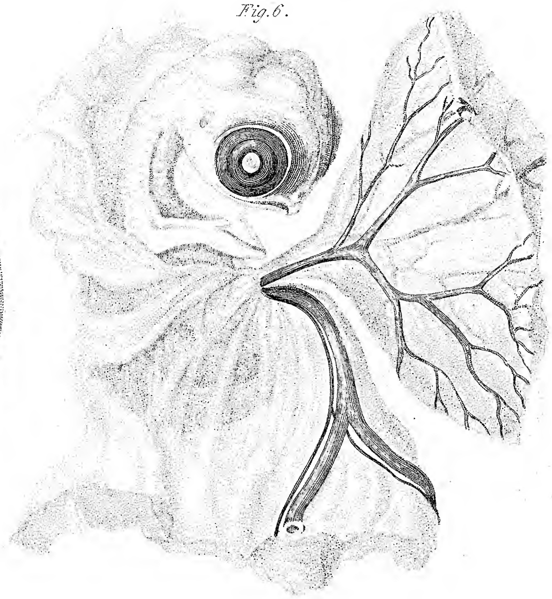

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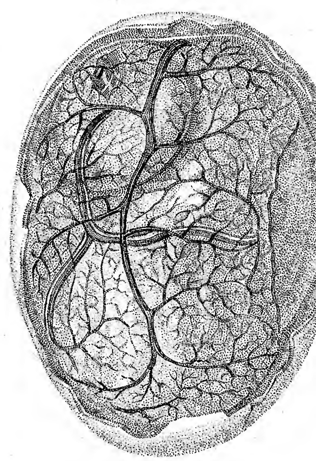

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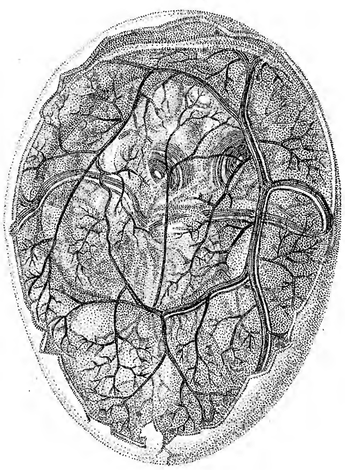

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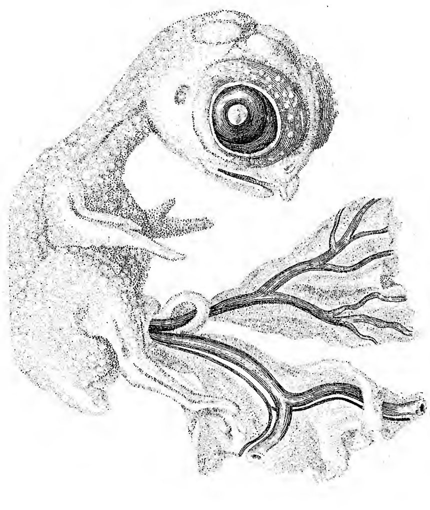

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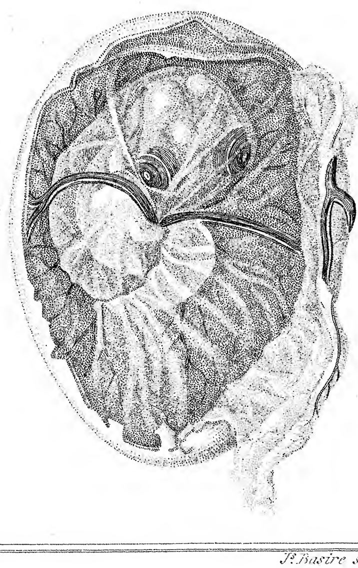
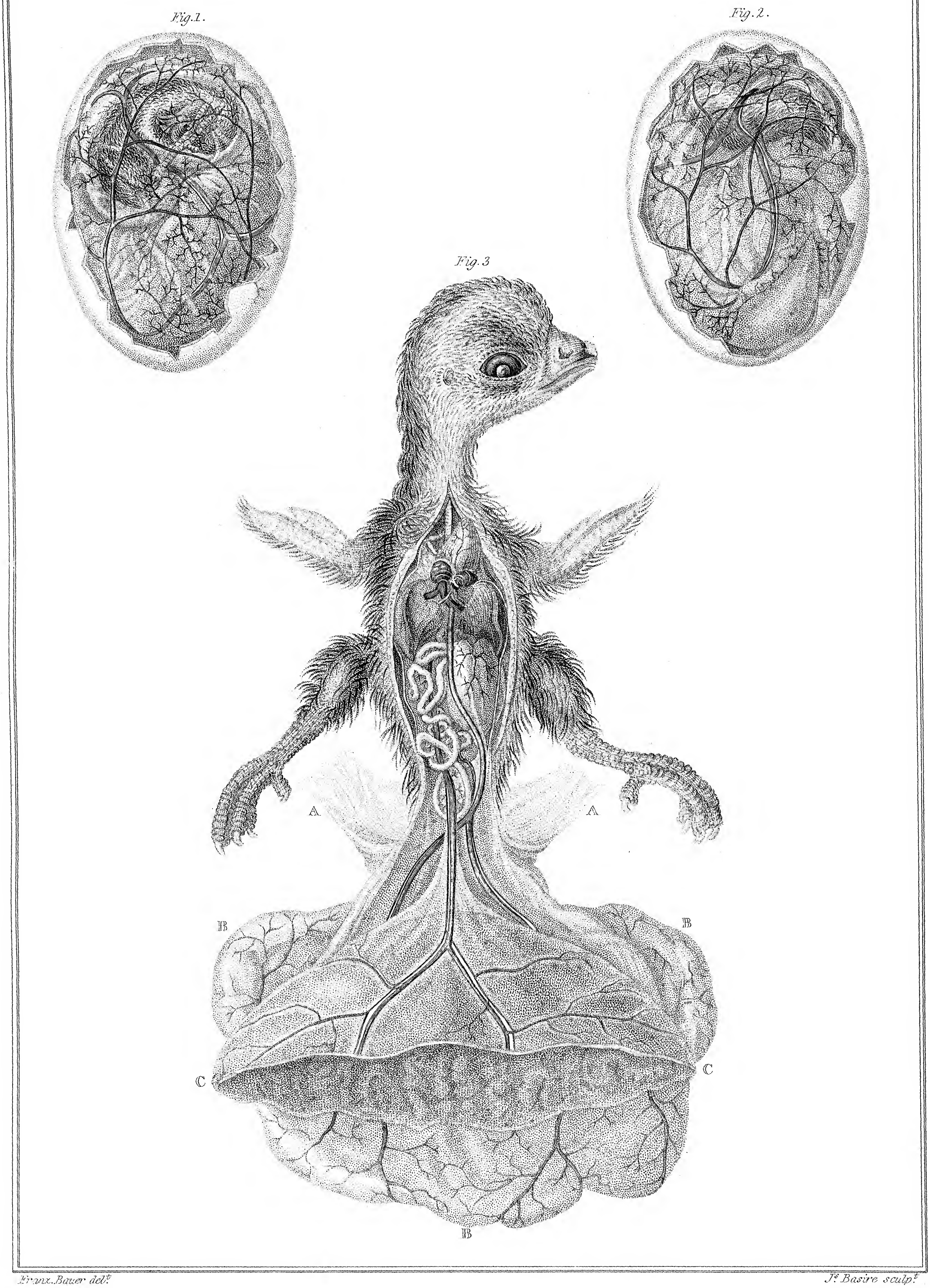


Franz Bauer del^t.

J^s Basire sculp^t.



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Js. Basire sculpt.

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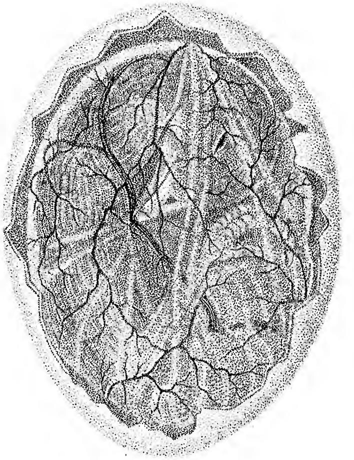

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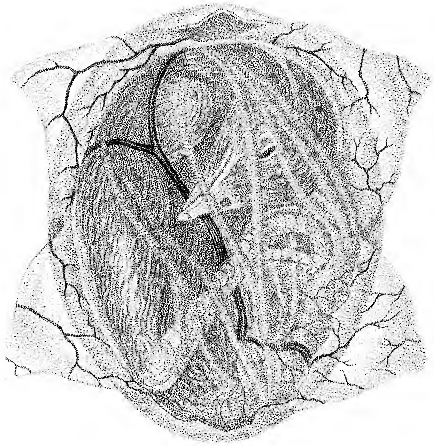

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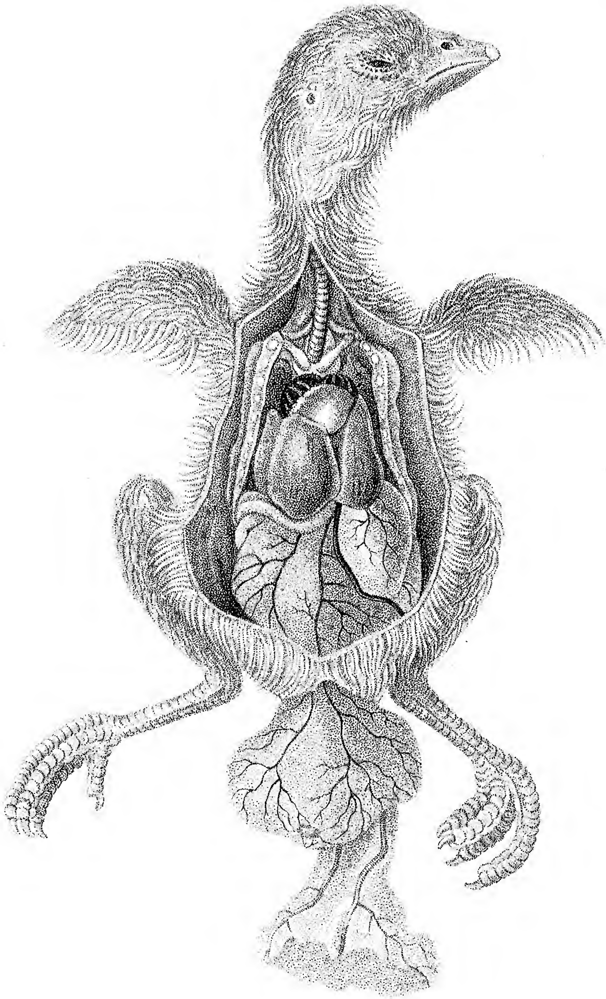

Franz Bauer del[t].

J[s] Basire sculp[t].

Fig. 1.

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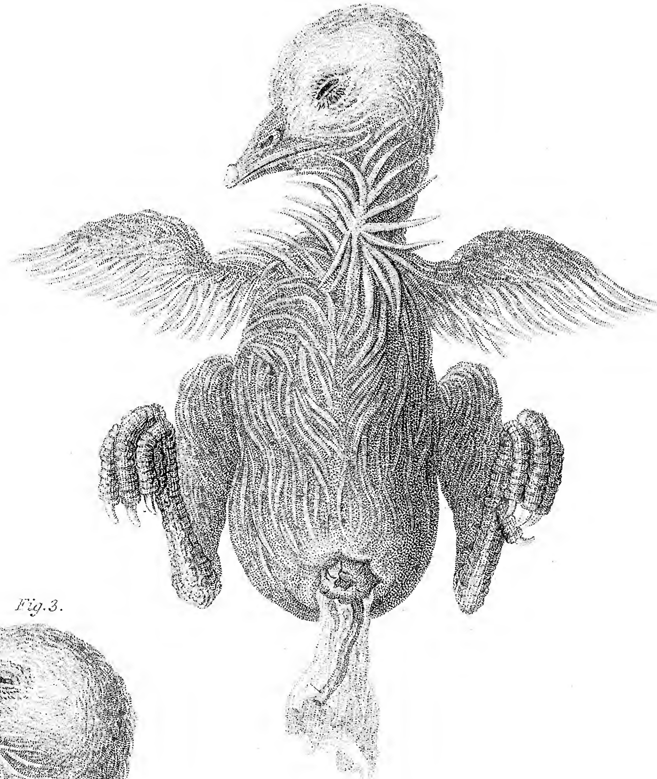

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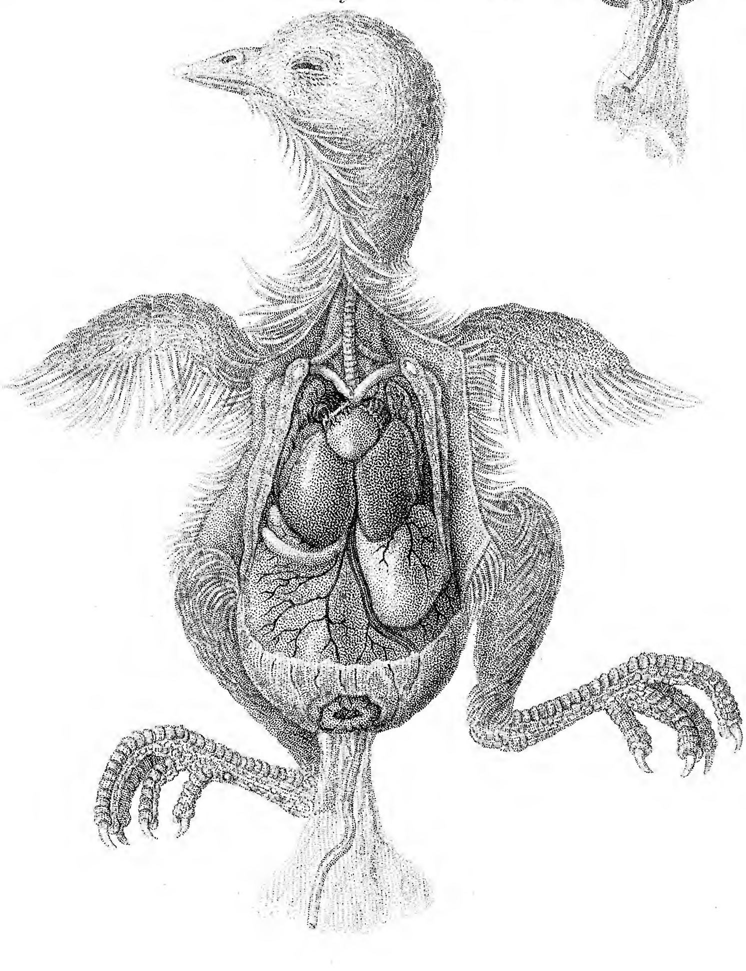

Franz. Bauer delt.

Js. Basire sculpt.

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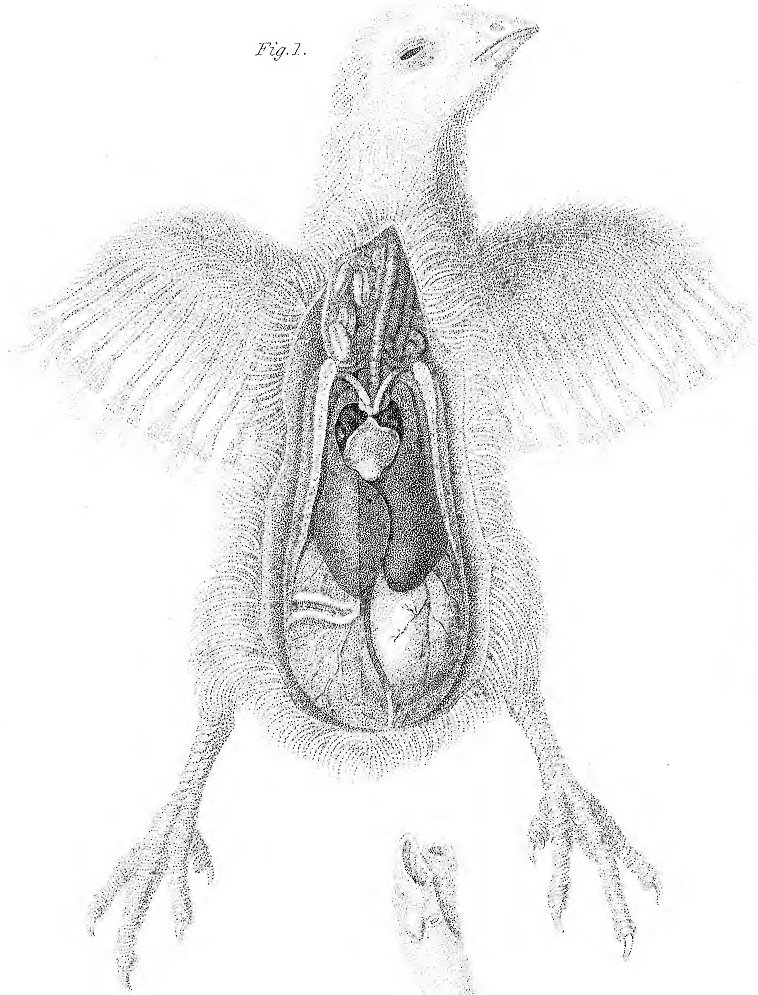

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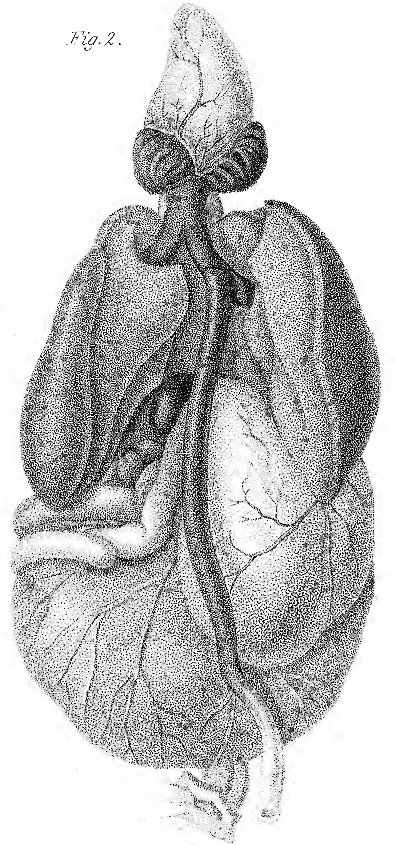

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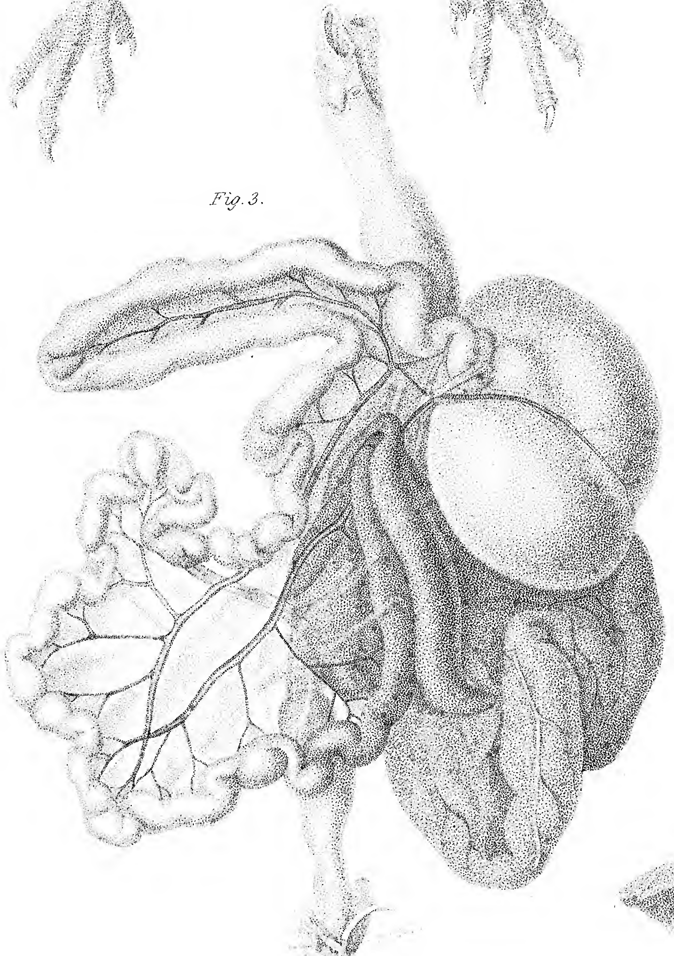

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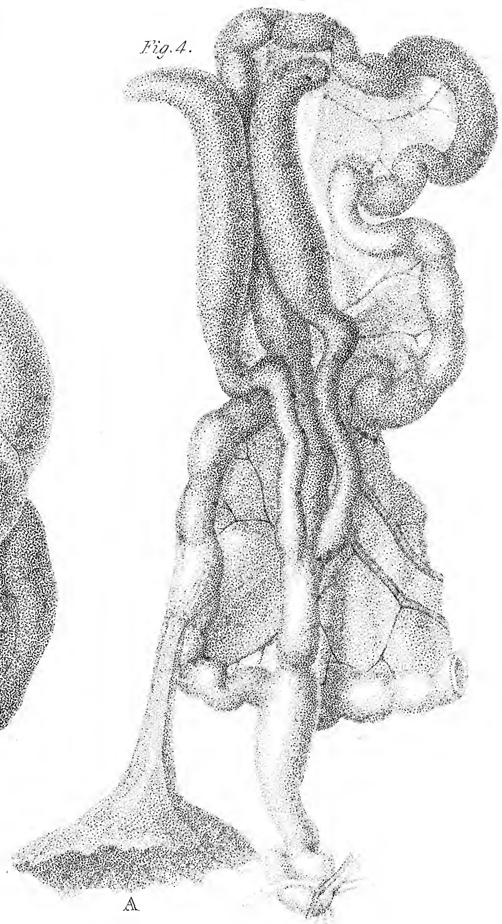

Franz Bauer del[t]

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